PRICE ONE SHILLING

HE CULTIVATION OF

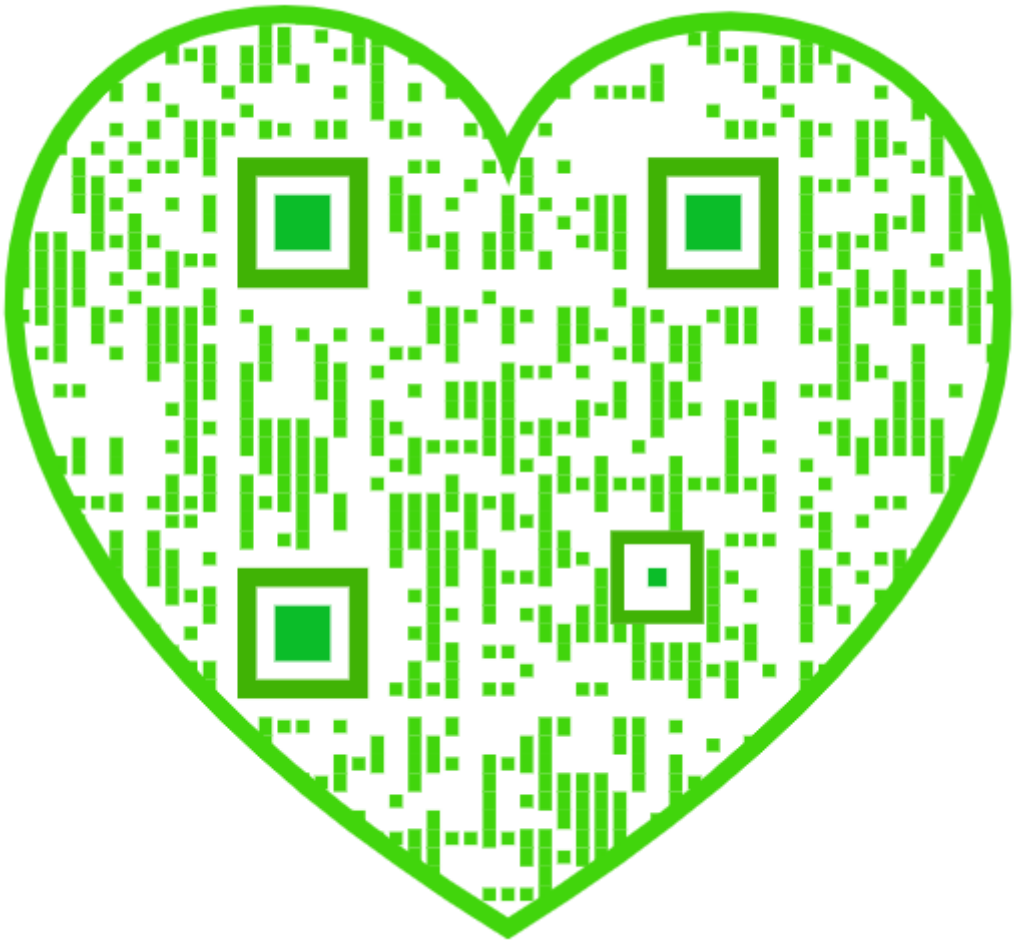
LIBERIAN COFFEE

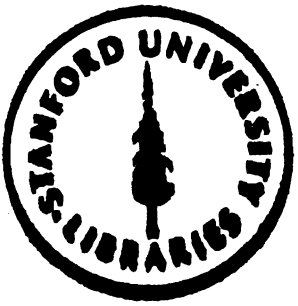
IN THE WEST INDIES.

BY

H. A. A. NICHOLLS, M.D.

LONDON:
S. W. SILVER & Co.,
SUN COURT,
CORNHIL

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BY

H. A. ALFORD NICHOLLS, M.D.

LONDON
S. W. SILVER AND CO.
OFFICE OF 'THE COLONIES AND INDIA'
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1881

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TO THE MEMORY

OF THE LATE

HONOURABLE JOHN IMRAY, M.D.

&c. &c.

THIS LITTLE WORK

IS

AFFECTIONATELY DEDICATED

CONTENTS.

Origin of Liberian Coffee—Introduction into the West Indies—Coffee in Dominica—The White Fly—Immunity of Liberian Coffee—The First Plantation at St. Aroment—Size of the Tree—Its Growth—The Leaves—The Blossom—The Berry—Its Durability—Altitude at which it may be Grown—Soil Preferred—Its Hardiness—Sun—Wind—Lime Trees as Shelter—Arrangement of Shelter Fences—Preparation of the Land—What Distance Apart to be Planted—Nurseries—Preparing Seed Beds—Hardening off—Planting Out—Caring for the Roots—Protection from the Sun—Mulching—Weeding—Undergrowth as a Protection—Manure—Topping Coffee Trees—Gathering the Crop—Pulping—Flavour of Liberian Coffee—Its Success in Dominica—Coffee Prospects of the Island—The Market Value of Liberian Coffee.

INTRODUCTION.

A FEW months ago I undertook to write some notes on the cultivation of Liberian coffee for the Chamber of Agriculture of Pointe-à-Pitre, Guadeloupe; and in the course of putting to paper the observations I have made on the plant, and the experience I have gained in its cultivation, the thought occurred to me that this observation and experience might be of service to those agriculturists in various parts of the world who have commenced to plant Liberian coffee.

Just as I was sending the manuscript of my short treatise to England, I received from Mr. Morris his 'Notes on Liberian Coffee, its History and Cultivation,' and for the time I abandoned my intention to publish the results of my experience; but a careful perusal of Mr. Morris's able paper led me to think that my less pretentious production might still be of service, the

delay being so far useful as to enable me to add an appendix giving some welcome information on the commercial value of the new staple.

If my little work proves to be of any use to the Liberian coffee planter, I shall be well repaid for what care I have bestowed upon it; and if any apology be needed for its publication I must plead my earnest desire to continue the efforts of the late Dr. Imray to establish in these lovely West India isles a cultivation that will once more render them the prosperous places their natural advantages fit them to be.

H. A. ALFORD NICHOLLS.

St. Aroment, Dominica:

March 1881.

ON THE

CULTIVATION OF LIBERIAN COFFEE

IN THE

WEST INDIES.

LIBERIAN coffee, as its name implies, is indigenous to Western Africa, where it was first discovered by Afzelius, who considered it to be a distinct species of the genus *Coffea*, N.O. *Rubiaceæ*. The species was afterwards described by Mr. Hiern in the *Transactions* of the Linnean Society under the appropriate name of *Coffea liberica*, and by this scientific designation it is now universally known.

Origin of Liberian Coffee.

The plant was first grown in England in the Royal Gardens at Kew during the year 1872, and from thence seedlings were forwarded in 1874 to Dominica and to several of the other colonies in the West Indies. Fortunately for the welfare of Dominica, the late Dr. Imray was then the Kew correspondent in the island, so that the young plants of this valuable species of coffee received from the first the fostering care of one of the ablest of our colonial botanists.

Its introduction into the West Indies.

Fifty years ago Dominica was essentially a coffee country; at one time, indeed, over three millions of

pounds of this staple were exported annually, and the coffee was of so fine a quality that the Dominica produce usually obtained the highest price in the English market. Unfortunately, however, early in the present century a blight attacked the coffee trees, and within a few years it committed such ravages that the cultivation of coffee became all but extinct. This blight, which was known as the 'white fly,' is a small Lepidopterous insect, the larva of which finds its way between the two layers of the epidermis or cuticle of the leaves, and feeds voraciously on the parenchyma, or soft cellular tissue. The upper and lower layers of the epidermis are thus disconnected from each other, the cellular tissue which joined them and which served to nourish them having been eaten away; consequently the epidermis dries up, and a brown spot on the leaf results. As the leaf grows, the dried epidermis, being unable to expand, cracks and curls up, and gives rise to a ragged appearance which has been erroneously attributed to rifling by small birds. Many of these blighted spots may occur on the same leaf, and in some instances very little of the leaf proper is left to perform the respiratory functions so necessary for the life of the plant. In the struggle for existence the coffee tree constantly puts forth new leaves, but these in their turn become affected by blight, the plant suffers in health, its crops diminish in quantity, and, as may readily be imagined, its length of life under such adverse influences is considerably shortened. The blight insect has been identified, from specimens and preparations I sent several years ago to Sir Joseph Hooker, as the *Cemiostoma coffeellum*, a moth which, within the last twenty-five years, has com-

The white fly.

mitted great ravages in the coffee plantations of Brazil and other countries of America. Mr. B. Pickman Mann states that 'this insect is said to lessen the coffee crop of Brazil by at least one-fifth.'*

Immunity of Liberian coffee from blight.

Naturally on the introduction into Dominica of a new species of coffee more vigorous than *Coffea arabica*, hopes were entertained that the leaves would be impervious to the ravages of the larva of the white fly; and these hopes happily were fully realised, for, to the great satisfaction of Dr. Imray and myself, the two young plants first introduced grew up in the vigour of health, and the large, dark, glossy leaves never once exhibited any sign of the depredations of the dreaded *Cemiostoma*. When seedlings were subsequently raised on the St. Aroment estate the tender cotyledons or seminal leaves were in some instances affected by the blight, but after the first pair of true leaves were formed the young plants grew up without any sign of disease, the thick epidermis proving a certain protection against the ravages of the insect. These young plants have since grown into large shrubs, and they are now free from blight, and loaded with flowers and ripe and unripe berries. The immunity enjoyed by Liberian coffee from the attacks of the blight insect is of the utmost importance to the welfare of Dominica and the neighbouring colonies, both English and French, for there is now nothing to prevent the islands of the Lesser Antilles from being once more large coffee-supplying countries. In Dominica the cultivation of coffee may be said to be re-established, although it is only as yet in its infancy, and the productiveness of the Liberian trees is a matter of astonishment to those of

* *American Naturalist*, June 1872.

the older residents who remember the coffee estates of forty years ago.

The first plantation.

The St. Aroment plantation has the honour of being the pioneer Liberian coffee estate in the West Indies, and, as yet, the small crops have been eagerly bought up for seed purposes by the planters of Dominica and the neighbouring islands. The small property was purchased by Dr. Imray, with a view to re-establish the systematic cultivation of the naturalised *Coffea arabica*, or, as it is called in the island, the 'native' or 'creole' coffee; but, after several years' unavailing struggle with the blight, he was on the point of abandoning the cultivation in the low-lands as hopeless, when the introduction of the Liberian species turned failure into success, and the sickly and languishing *C. arabica* was cut down to make room for the hardier and healthier *C. liberica*.

Unhappily, just as Dr. Imray's hopes for the re-establishment of coffee cultivation in the island were realised, death removed him from the scene; and Dominica, in her commencing prosperity, was plunged into mourning for the loss of the able man of science, who by his far-seeing wisdom had insured that prosperity by the introduction of two new and profitable cultivations.*

The Liberian coffee plant differs considerably in size, appearance, and habit from the Arabian or 'creole' species, and this fact has a great influence on its mode of cultivation.

Size of the tree.

The single main stem of the creole coffee will reach a height of from ten to fifteen feet, if it be allowed to

* Dr. Imray was the originator of the lime cultivation in Dominica.

grow to its natural size, and the lateral branches will spread from two to four feet on either side, thus covering a circular space of six feet or more in diameter; but, in cultivation, the bush is dwarfed, or 'topped,' at convenient heights for picking the berries, and in consequence the lateral spread of the branches is artificially increased—the extent of surface covered by the entire plant being in inverse ratio to its height.

The Arabian coffee, then, with botanical exactitude, may be described as a small *shrub*; the Liberian species, on the other hand, would appear to be a small *tree*, for in Africa it is said to attain a height of over thirty feet. Instead of a single stem it has five or six stems growing out of the ground, and in some instances I have counted as many as ten. This habit has a most important bearing on the cultivation, for when one of the stems becomes old and sterile it may be removed, not only without any injury to the crop, but with actual benefit to the productiveness of the plant. Thus plantations of Liberian coffee may be continually invigorated by the judicious pruning away of some of the main stems; whereas in removing the main stem of the ordinary coffee a sucker has to be trained up in its place, and one or two crops are lost.

Curious habit of growth.

The appearance of the Liberian coffee is very unlike that of the Arabian, for, in addition to the subdivisions of the main stem, the leaves are at least twice the size of those of the other species. I find an average Liberian coffee leaf to be eleven inches long and four inches wide in its broadest part; whilst the measurements of an average leaf of the so-called creole coffee were respectively five inches and one and three-quarter

Size of the leaves.

inches. On examining a young Liberian plant about a year old, twenty-three inches high, with no lateral branches yet formed, and with fourteen pairs of leaves (several of the lower pairs having fallen), I found two of the leaves to have measurements slightly in excess of the above, and the uppermost internode was four inches in length. The leaves of the Liberian coffee bear in size and shape a resemblance to those of the cacao tree, and the old peasants on first seeing the 'new English coffee,' as they call it, are greatly astonished at the bigness of the plant.

The blossom. The flowering of the Liberian coffee planted in Dominica commences in January or February, and goes on for several months, and consequently the curious sight is seen of flower buds, flowers, and fruit in all stages of growth on the same branch. To those accustomed to the habit of the 'old' coffee this appears most curious, and it certainly is a striking peculiarity.

The berry. As might be imagined from the size of the tree, the flowers, the berries, and the beans are much larger than those of the ordinary coffee. The berries, which are borne in wonderful profusion, are twice the size of those of *Coffea arabica*, and the bean itself is of equal proportions. I have counted as many as sixteen berries in the axil of a leaf, but it is more usual to find from six to ten.

Ripening of the berry. An important distinction between the Arabian and Liberian coffee is that the ripe berries of the latter do not fall from the tree, but remain firmly fixed in their positions for an indefinite time. Dr. Imray says, 'I find the fruit of *Liberica* reddens very slowly, and the berries remain hard and firmly fixed to the branches by short,

stout peduncles.' * I allowed the berries to remain on some of the trees at St. Aroment for more than two months after they had fully ripened, and there was no deterioration whatever in the coffee. The pericarp, indeed, became dry in a few instances, but the beans inside remained quite fresh. This habit of retaining the ripe fruit is of considerable consequence in the cultivation, for the berries can be gathered when convenient, whereas in the case of the Arabian coffee and its various varieties, the gathering of the crop is a trying and anxious time for the coffee planter. All the berries of *C. arabica* ripen at about the same time, and great numbers of labourers are required to gather in the crop, or the loss sustained by the fall of the fruit is very large indeed. Mr. H. E. Stainbank says, in reference to this matter, 'It is probable that the scarcity of labour has had much to do with the stationary character of the coffee enterprise at the present time. As coffee is pre-eminently a pursuit requiring constant vigilance and instant attention, a want of hands at a critical time causes such loss that planters fear to undertake the risk.'†

Durability of the ripe berry.

Although the ordinary varieties of coffee will bear in the low-lands of the tropics, they succeed best at elevations ranging in different countries from 1,000 to 4,000 feet above the sea-level. If grown below a thousand feet experience proves that the trees are prone to become affected by blight, and that the heat and the aridity of certain seasons of the year seriously affect the

Altitude of ordinary coffee.

* *Report on the Progress and Condition of the Royal Gardens at Kew during the year* 1877.

† *Coffe in Natal: its Culture and Preparation.* London, 1874.

Growing at low levels.

crops, and may even cause the decay or death of the plants. On the other hand the experiments made in Dominica and elsewhere show conclusively that Liberian coffee succeeds best at low levels, and that it will even grow well close to the sea shore. The elevation of that part of the St. Aroment estate planted in coffee is from 300 to 400 feet above the sea-level, and at this height Liberian coffee is cultivated with success. On the Malgré-tout estate, at an elevation of from 1,200 to 1,400 feet, some Liberian plants, although doing well, do not grow so rapidly, nor do they appear so robust as those of a similar age at St. Aroment. It thus appears that, whilst *Coffea arabica* and its many varieties should be cultivated in the hills, *C. liberica* may be planted with the greatest success on low-lands in the tropics; and, considering that the present cultivation of most of the estates in the low-lands of the lesser islands of the West Indies is not paying, this conclusion is of the utmost importance to planters generally.

Soil.

The soil of Dominica is volcanic, being formed for the most part of decomposed trachytic rocks; in some places, however, a stiff clay is met with, and coffee does not do so well in this soil. Mr. P. L. Simmonds states:—'The coffee now being cultivated in Liberia is from plants originally procured from the forest, but greatly improved by cultivation. It is grown both on light alluvial soil near the coast, and on gravelly soils in the interior.' * From these facts it may be inferred that volcanic, alluvial, and gravelly soils are best adapted to the cultivation of Liberian coffee, but it must be remembered that the plant appears to thrive in all parts

* *Tropical Agriculture.* London, 1877.

of the world where the commoner coffee grows, as will be seen on reference to the Kew Reports for the last few years.

Its hardiness.

Liberian coffee is hardier and more robust than any other kind I have seen, and it follows from this that it will better bear exposure to wind and sun than the ordinary species. At St. Aroment most of the coffee plants have grown up with very little protection from the sun, and, although it must be said that the loss of young seedlings has been considerable, those plants grown entirely in the shade are weaker and have a less healthy appearance than those exposed to the sun's rays. Similar experience seems to have been met with in the Seychelles, for Mr. C. S. Salmon, the Chief Commissioner, writes to Sir Joseph Hooker as follows:— 'About 150 plants of Liberian coffee—mostly raised from seed you sent—have been planted at Mahé Island at elevations varying from the shore to 1,500 feet above the sea-level. It comes best, apparently so far, in the open without shade. One plant at an elevation of about 300 feet, without any shade and close to a granite rock giving out considerable heat, has about 100 strong-looking flowers on it. This plant is eighteen months old.'*

Sun.

Wind.

Liberian coffee will grow in situations exposed to the wind, but in the West Indies it requires for its successful cultivation the protection of belts of trees. When coffee was first planted in Dominica no protective belts were employed. For, according to Lowndes, not 'until some dreadful ravages by hurricane suggested to the planter the idea of protecting his plantations from the winds, was the planting these fences ever thought advisable

* Quoted in Kew Report for 1879.

or necessary.'* The trees always used in Dominica to form these protective belts were of two kinds, the 'Pois-doux' (*Inga laurina*) and the 'Rose-apple' (*Jambosa vulgaris*), but the preference was given to the former tree, which was thought to improve the richness of the soil by throwing down large quantities of leaves. The pois-doux is unquestionably an excellent tree for the purpose for which it was used, and it might even now be employed instead of, or in conjunction with, the 'Bois-immortelles' of Trinidad (*Erythrina umbrosa*), as a shade tree for cacao plantations. Whilst, however, the pois-doux and rose-apples answered very well for 'lisiers,' as the protective belts were called in Dominica, they occupied a considerable space of the available ground, for they were planted in squares, the sides of which were less than sixty feet in length; and thus a large percentage of the land became to all intents non-productive. In the laying out of St. Aroment, the important question of fences was fully considered by Dr. Imray, and he increased the 'coffee squares' to double the size of former days, and planted limes (*Citrus limetta*) in the place of the indigenous pois-doux and rose-apples. Thus, the sides of the squares are 120 feet long, and the sheltering trees give a valuable crop of limes—the present price of lime juice boiled down or 'concentrated' to one in ten being about £20 a hogshead. The system originated by Dr. Imray is an improvement in every respect, and I doubt not that it will be universally followed when it becomes generally known. It must be remembered, however, that the lime 'fences'

Lime trees as shelter.

* *The Coffee Planter*, by John Lowndes, Planter, Dominica. London, 1807.

at St. Aroment were planted originally for the protection of the creole coffee, so that when the Liberian trees become fully grown the squares will doubtless be found to be too small; but this is a defect easily remedied, and in the meantime the lime trees are helping to pay for the cultivation of the coffee. In opening a Liberian coffee plantation it will, I believe, be found more desirable in many respects to enclose by protective fences not less than an acre of land, and in cases where level forest land is brought into cultivation, and wide belts of the original high trees are left, five or six, or even ten acres, will not be too much for a single square or field.

Arrangement of shelter fences.

The arrangement of the squares depends in a great measure on the nature of the exposure and the lay of the ground; for a distribution of tree belts suitable for level land will be found quite inadequate for the protection of coffee planted on exposed hill sides. In the latter case, belts or fences of trees transverse to the direction of the prevailing winds will be found necessary, and it may be laid down as a general rule that the greater the exposure the smaller must be the dimensions of the squares.

In regard to the preparation of the land, I do not propose to enter at length, as full particulars may be obtained from the various excellent manuals published on coffee cultivation. I may, however, point out that coffee, being a seed crop, requires a rich soil, so that, if the land to be planted is poor or worn-out, judicious manuring of the young plants is essential for their well-being.

Preparation of the land.

The proper distance at which Liberian coffee should be planted has not yet been satisfactorily determined.

Distance apart to be planted.

At St. Aroment each tree is ten feet from its fellow, and the rows are also ten feet apart, but I doubt not at this distance the trees will eventually be found to be too close together. In the olden time some planters in Dominica adopted this distance for the creole coffee—a much smaller vegetable production, as I have pointed out, than Liberian coffee. Lowndes states that he planted nine feet squares, and he found this, as he says, 'upon experience, in good soil, neither too wide nor too near.' Judging from this, and taking into consideration the size of the Liberian coffee trees, eighteen or even twenty feet may not be too wide a space between the mature plants. I believe, however, that ten feet is the proper distance to plant *at first*, and afterwards, should occasion require it, each alternate tree may be cut down, but the necessity for this cannot arrive for several years after the first crops are gathered. In the mean time the ground will be occupied by fruitful trees, and the expense of cultivation, after the first planting, will not be increased by the extra number of trees. Mr. Morris, the Director of the Public Gardens and Plantations in Jamaica, has advised, in the case of chinchona cultivation, that the young trees should be planted close together and afterwards thinned out, for the two excellent reasons that the close planting keeps down the weeds, thus lessening expense of cultivation; and that the bark of the young saplings, when cut down, will give a certain return. The only difference in the case of the coffee is that the trees to be sacrificed give the return before they are cut down instead of afterwards.

Nurseries.

As with the ordinary kinds of coffee, so with the Liberian, it is necessary to form nurseries in sheltered

situations for the raising of seedling plants. The seeds, it is true, may be planted out in the fields, but this is a very uncertain, and hence unsatisfactory, mode of forming a plantation. Several of the squares at St. Aroment were treated in this way, but with only partial success. The greater number of the seeds sown in the fields may germinate, but the tender seedlings are liable to so many vicissitudes of weather, and they run so many risks from carelessness on the part of the weeders, that this method of planting is likely to be followed in exceptional cases only. When the system of sowing the seeds in the open is followed the greatest care must be taken in preparing the holes, and not less than three seeds, at distances of six inches from each other, must be put in each hole; and, as the young seedlings will require shade, plantains or some other suitable plants must be grown amongst the coffee. In fact each hole will have to be treated as a miniature nursery until the strongest seedling is sufficiently grown to take care of itself.

Sowing in the open.

A sheltered position having been selected for seed beds (which, for the convenience of weeding, should not be too wide), the ground must be dug up to the depth of two feet, the earth must be pulverised, and all stones, roots, and other impediments must be carefully removed. These precautions are necessary in order that the delicate root fibres of the seedlings may easily penetrate the soil. A very good plan is to mix powdered charcoal with the earth, for the ground is thereby rendered less cohesive and the moisture is better retained. The seeds should be carefully put in an inch or an inch and a half below the surface, and at distances of three or four inches from each other.

Preparing the seed beds.

Hardening off.

When the seedlings have two or three pairs of leaves besides the cotyledons, they should be hardened off preparatory to planting out in the fields, for if this be not done many will fail, notwithstanding the greatest precautions. This hardening process may be accomplished by planting the seedlings in larger beds in less sheltered situations; but a far better plan, where practicable, is to put the seedlings into bamboo joints cut in the form of flower pots, and pierced below for drainage. As the young plants grow, the bamboo pots can be moved to more exposed places, and in this manner the seedlings are hardened off with but a trifling loss in their numbers. The plants should have at least six or eight pairs of leaves before they are put out in the fields, for if they be transplanted too early a large proportion will die. This is a most important point, and inattention to it may result in a loss of the greater number of the young plants. Dr. Imray says, 'I lost a good many seedlings by putting them out when too small. To ensure their rooting, they should be pretty well grown before they are transferred to the field.'*

Planting out.

The land having been lined out and pickets firmly planted at the distances decided on, the next thing is to dig the holes for the reception of the young plants. These holes should be at least two feet square and two feet deep, and they may be allowed to remain open for a week or two, or even much longer, in order to oxygenate the soil. Should the land be poor, a basket of manure from the compost heap may be put into the hole before filling in the earth, for it must be remembered always that one can scarcely nourish coffee trees too much.

* Kew Report for 1879.

In order to ensure regularity the young trees should be planted exactly where the pickets were placed, for irregular lines are displeasing to the eye; some planters, indeed, go so far as to say that they prevent expeditious weeding, and retard the gathering of the crops. Shortly before the plants are put out in the fields the holes must be filled up, care being taken not to put back any stones or other hard materials that might interfere with the penetration of the root fibres, for each plant should be placed under the most favourable conditions for fixing itself firmly in its new position. The holes being prepared, the young coffee trees must be taken from the nurseries, or removed from the bamboo pots, and planted out during a shower or soon after rainy weather. The best way to remove the plants from the pots is to split the bamboos by a sharp stroke of the cutlass; the two halves are then easily separated, the damp earth cohering and preventing any disturbance of the roots. A small hole is then made in the loosened soil, the young coffee tree is held by the left hand in position in the hole, and the earth is filled in with the right hand, and gently, but firmly, pressed down round the stem. If the tap-root of the nursery plant be so long that it cannot be put in the hole without being doubled up, or if it be in any way injured, a portion of it should be sliced off obliquely with a sharp knife. In planting creole coffee in Dominica the tap-root is frequently broken off, but this is a system contrary to all laws of horticulture, for in plants, as well as in animals, a clean cut heals much sooner than a jagged wound. All the roots must be covered, and no portion of the true stem must be buried, for to plant too deeply

The roots.

is nearly as great a fault as to leave the roots uncovered. In consequence of removing the stones, &c., it may be found that the earth taken out is insufficient to fill up the hole, in which case some of the surface soil can be gathered in, for otherwise the sinking of the loose mould will cause the plant, to its detriment, to be considerably depressed below the level of the field. Some planters advise that the holes should be filled entirely with soil raked from the surface; the system is a good one, for the superficial layers of the earth are always richer than the deeper ones; but to fill up holes two feet square and two feet deep with surface soil, and afterwards to spread the earth dug up, will greatly increase the expense of planting.

Injured plants.

Should the roots of the seedlings be injured in the transplanting, it will be well to remove a few of the lower leaves so as to restore the balance between the sap-making and the sap-elaborating organs of the young tree. In cases, too, where it is feared that dry weather will come on soon after planting out, it will be a wise precaution to lessen the number of leaves on the young tree.

Protection from the sun.

If the weather be wet, the coffee may now safely be left to take care of itself, but at other times protection from the sun may be afforded by fixing four or five small branches of trees in the ground round the plant. I have found the smaller branches of the mango to be excellent for this purpose, but any forest tree will furnish the necessary boughs. In reference to this subject Dr. Imray says:—'Protection of some kind or other is advisable at first, as well from the scorching rays of the mid-day sun as from strong winds. When

firmly rooted and growing, the plants are hardy enough, and will bear a good deal of exposure and neglect.' * During dry weather it is desirable to protect the roots of the young trees by covering them with dried weeds, straw, or the 'trash' of the sugar cane; this system of 'mulching,' as it is called, has been followed with great advantage at St. Aroment. Mulching.

Too much care cannot be bestowed on planting out the coffee in the fields, for at this time the results of all the previous work are liable to be swept away by inattention to what to the inexperienced may appear to be trifling details.

After the young plants are established in the fields they will require constant weeding, and this necessity in the cultivation of coffee was recognised by the early planters in the West Indies. Writing in 1797, Laborie says: 'There is not perhaps any plant which requires more purity of soil than the coffee tree. Weeds keep it back, cause it to grow yellow, fade, wither, and even perish.' † Some planters advocate incessant weedings; indeed, Mr. Lascelles says: 'From the day the coffee trees are put in, no other green leaf should be seen in the estate, but every weed should be pulled up before it is three inches high.' ‡ I cannot, however, agree with this, for I think a thin carpeting of low plants has a beneficial effect by protecting the ground from the scorching rays of the sun, and by preventing the surface soil from being washed away during heavy rains. The system adopted at St. Aroment is to keep Weeding.

* Kew Report for 1879.

† *The Coffee Planter of Saint Domingo.*

‡ *A Treatise on the Nature and Cultivation of Coffee.* London, 1865.

a space of about two or three feet round the tree constantly clear of weeds, and to 'cutlass' the rest of the ground. The 'cutlass,' or 'matchete,' is a long, broad, heavy knife, and the weeds and grass are by it mowed or chopped close to the ground. In the hands of a strong man the cutlass is a most useful and powerful agricultural implement; and for the expeditious clearing of the 'bush' in the West Indies it is almost indispensable.

The weeding is usually done by women, who also hoe up the roots of all the large weeds and rank grasses. Weeding round the trees must be done by hand, with the assistance, perhaps, of a small trowel or an old cutlass. The hoe should not be allowed to be used in weeding the coffee holes, for otherwise the delicate superficial roots—of which the Liberian coffee has a great number—will be injured or cut off.

Under-growth as a protection.

It has been advised to put in plantains, bananas, 'tanias' (*Colocasia esculenta*), and other food plants between the rows of coffee, in order to protect the land from the sun and to shelter the young plants. This system appears to me to be a good one, and I think by following it the loss of the plants during dry weather will be reduced to a minimum. I intend to try it at St. Aroment, for the extra nourishment required in the soil can be easily made up by manure, or the plantains, &c., may be cut down before fruiting, the stems and leaves being allowed to rot on the ground, and thus increase, instead of taking away from, its richness.

Mr. Stainbank advocates the system of catch crops, and he advances some strong arguments in favour of the general adoption of the plan.* Should anything

* *Coffee in Natal: its Culture and Preparation.* London, 1874.

be planted between the coffee rows, care must be taken that the young plants are not too much covered up, for, as I have shown, they grow best in open spaces when they are once firmly rooted. After the trees have commenced to flower the catch crop system must, of course, be abandoned, for then the coffee requires all the nourishment it is possible to give it.

Manure.

The question of manure is one of the greatest importance, and, when possible, the soil should be analysed so as to ascertain whether it contains all, and enough of, the constituents necessary for the wellbeing of the coffee plant. For the first few years pen or stable manure will be found sufficient, but, when the coffee trees bear, some fertilising material other than the 'compost' must be employed if it be wished to keep up the vigour of the plants, and I know of nothing which gives better results than Ohlendorff's special coffee manure.

Topping coffee trees.

I have not yet satisfactorily determined whether Liberian coffee trees should be 'topped,' for, as the plant is so much larger in every respect than the creole coffee, to endeavour to dwarf it to a convenient height for picking is scarcely likely to be followed by success.

Gathering the crop.

Unlike the creole coffee, the main stems of the Liberian species bend very readily, and do not split or break even with rough treatment; but the bending of the boughs will not permit the berries to be gathered from the upper branches of my biggest trees. I have, therefore, had constructed two ladders connected at the top by strong hinges, so that they may be inclined to each other at various angles; the degree of separation of the lower ends being regulated by a chain perma-

nently fixed to one ladder, and capable of being hooked to the other. This contrivance answers admirably, for by using the ladders between the rows the berries are picked from the highest branches of the trees with the greatest ease.

Hitherto all the produce of the trees at St. Aroment has been used for seed purposes, so that I am unable to give any experience concerning the preparation of Liberian coffee for the market.

Pulping machines.

The pericarp of the berries is hard and fibrous, being very unlike the soft sweet 'pulp' of the Arabian species. This hardness will doubtless at first cause some trouble in the pulping process, and, I believe, some modifications will have to be made in the construction of the ordinary coffee pulpers, but this is a matter for subsequent experience. Dr. Imray found that Gordon's breast-pulper did not answer well for Liberian coffee, for in spite of the most careful adjustment the quantity of broken beans was large. Lately Mr. E. T. Dawbiney has made some experiments on the Malgré-tout estate with the pulping machine known as the 'rattle-trap,' and this old but admirable piece of mechanism, described and figured so well by Laborie, has thus far proved quite capable of pulping Liberian coffee berries. Mr. W. Sabonadière says of this pulper: 'In Laborie's days what modern planters now call the "rattle-trap" was the only machine known, and it is saying a good thing for its inventor that, with some simple modifications, it is still a general favourite.'*

Flavour of Liberian coffee.

It has been stated that the flavour of the Liberian coffee is inferior to that of other kinds, and that as a

* *The Coffee-Planter of Ceylon*. London, 1870.

necessary consequence it is unlikely to sell in the European markets. I believe, however, that the produce of the Liberian tree will sell well, for I have tasted the coffee, and I find it to be of excellent flavour. Mr. Simmonds writes, in 'Tropical Agriculture,' as follows: 'From present indications, in a few years the export of coffee from Liberia will be considerable, and its rich and superior flavour will secure for it a corresponding demand at remunerative prices'; and in another place, in the same work, he says that its quality is in no wise inferior to that of the best Java coffee.

Its success in Dominica.

The success that has attended the introduction of Liberian coffee into Dominica is somewhat remarkable. Seeds and plants were, I believe, simultaneously sent from the Royal Gardens at Kew to Dominica, Jamaica, and Trinidad; yet, at the present time, large supplies of berries for seed purposes are exported from Dominica to Martinique, Guadeloupe, Jamaica, St. Kitts, and Trinidad.

Coffee prospect in Dominica.

The history of the establishment of the new cultivation is full of promise to the future of the island. The plant is thoroughly acclimatised, the young trees are unaffected by blight, and their fruitfulness is, as I have shown, a subject of wonder to those who remember the coffee plantations of forty years ago. In the island there are many abandoned estates, and large tracts of virgin soil, well watered with fine streams, eminently adapted for the cultivation of coffee and limes, and other tropical plants; and with these facts before one it is not difficult to foretell that, before many years are passed, Dominica coffee will once more take a high rank in the European markets. Dr. Imray always held the opinion that the

re-introduction of the coffee cultivation would cause Dominica to become one of the most prosperous islands of the Lesser Antilles; and I cannot conclude this short treatise in a better manner than by giving a published extract from one of his letters to Sir Joseph Hooker. The extract is to be found in the Kew Report for the year 1876, and it is as follows:—

'It appears to me that the new species of coffee is peculiarly adapted to this island. So far as the temperature and rainfall are concerned, the climate approximates very closely to that of Liberia, from whence the plant comes. If the cultivation of Liberian coffee is generally taken up in Dominica, as I think it will be, there is a future for this little country. There are thousands of acres of splendid coffee land that might be cultivated in this island with no fear of the "white fly" before the eyes of the planter, for the Liberian tree bids defiance to its attacks. Indeed there is a very eligible field for settlers here with a little money in their pockets who wish to cultivate coffee. It might be pleasanter and more profitable in the long run to set their faces towards the west instead of the "far east."'

APPENDIX.

THE welcome news of the high value of Liberian coffee, conveyed to me in Mr. Morris's letter of March 10, enabled be to contradict the reports circulated in the island as to the *worthlessness* of the new produce. Accordingly I wrote the following letter to the local newspaper, and I reproduce it here, as it contains information of importance to all Liberian coffee planters. The value of Liberian coffee.

LIBERIAN COFFEE.

To the Editor of the 'Dominican.'

KINGSLAND HOUSE,
21*st March*, 1881.

SIR,—For some time past stories have been in circulation in the Island to the effect that the cultivation of Liberian coffee is a mistake, inasmuch as there is very little sale for the produce on account of the coarse flavour of the bean. I have endeavoured as far as possible to counteract these mischievous stories, for I fear they have deterred persons from embarking in the new cultivation; but as I am considered to be interested in the matter, my contradictions have not as yet borne much weight.

By last mail I received a letter from Mr. Morris, the able botanist, who has lately been appointed Director of the Public Gardens and Plantations in Jamaica; and, as will be seen from the following extract from this letter, the question of the great value of Liberian coffee is now authoritatively answered in the affirmative. Mr. Morris writes: 'From the enclosed extract from the *Ceylon Observer* you will notice that Ceylon-grown Liberian coffee has lately obtained 93*s.* per cwt. in the New York market. This is a most encouraging result, and, as we are so favourably situated as regards the American markets, the West Indies ought certainly to compete successfully with the East Indies in the future culture of this coffee.'

Its market price.

I enclose the clipping from the Ceylon paper kindly sent by Mr. Morris for my information, and the news it contains is so important and so welcome to coffee planters generally that I will ask you to be good enough to publish it *in extenso*.

I am, &c.,

H. A. Alford Nicholls.

From 'Ceylon Observer,' January 21, 1881.

Our prophecy of a high character and good price for Ceylon 'Liberian' coffee has come true sooner than we expected. We received from Messrs. Aitken, Spence, & Co. to-day the welcome news conveyed to them by a telegram from New York announcing the sale there of a consignment of 'Putapowla' coffee at 20 cents per lb.,

which, at the present rate of exchange ($4·81), is equal to 93*s.* per cwt. or 12*s.* above the current quotation for middling plantation Ceylon (Arabian) coffee in the London market. This must certainly be considered a most encouraging piece of news to the planters of this favourite 'new product,' and we congratulate the enterprising proprietors of the well-known pioneer estate in the Kalutara district on being the first to settle the market value of this description of Ceylon coffee.

Altitude and temperature.

It may be mentioned that the district in which the above coffee was grown is situated at almost sea-level in latitude 6° 37′ N. According to the Ceylon Public Works Department's returns, Kaltura has an average total rainfall (on observation for five years) of 93·81 inches per annum, and an average mean temperature (also on observations for five years) of nearly 79° Fahrenheit.

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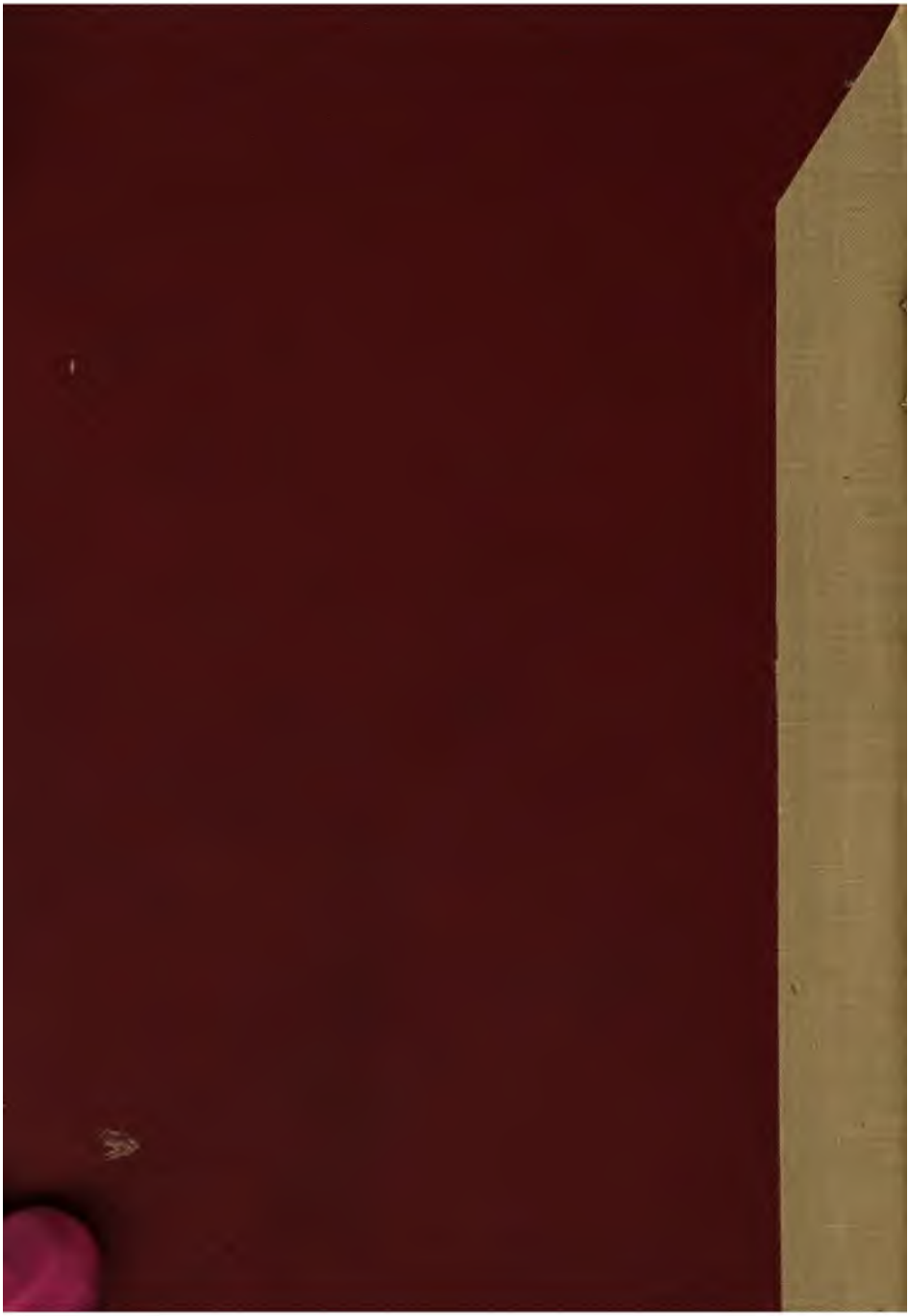
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